ADMINISTRATIVE INFORMATION

1. **Project Name:** Distributed Wireless Multisensor Technologies

2. **Lead Organization:**
General Electric Global Research
One Research Circle
Niskayuna, NY
12309

3. **Principal Investigator:**
Daniel Sexton
Phone: 518-387-4121
Fax: 518-387-4042
Email: sextonda@crd.ge.com

4. **Project Partners:**
Jay Werb
Sensicast Systems
220-3 Reservoir St.
Needham, MA 02494
Phone: 781-453-2555
Fax: 781-453-0601
Email:jwerb@sensicast.com

Shepard Salon, PhD.
Rensselaer Polytechnic Institute
110 8th St.
Troy, NY 12180
Phone: 518-276-8296
Fax: 518-276-6226
Email: Salons@rpi.edu

Mike Costello
Chevron Texaco
Phone: 713-752-7228
michaelcostello@chevrontexaco.com

5. **Date Project Initiated:** Jan. 1st, 2004

6. **Expected Completion Date:** Dec. 31, 2006

PROJECT RATIONALE AND STRATEGY

7. **Project Objective:**

This project aims to further the adoption of wireless sensor technology by providing a novel wireless sensor approach to reducing electric motor energy usage across multiple industries providing value for end users.

8. **Technical Barrier(s) Being Addressed:**
Continuous electric motor monitoring is currently limited to mostly critical or high value assets where the value of the asset warrants the high cost of deploying sensors. In all other cases motor

inspection may be done manually and periodically if at all. By reducing the cost and complexity of sensor deployment it is anticipated that continuous monitoring will become pervasive which will allow industries to better maintain and improve the efficiency of their electric motor assets. Key technical barriers being addressed in the wireless telemetry area include reliable robust communications and device longevity at a reasonable cost. This will be achieved through the use of advanced networking and extensive onboard energy management.

9. **Project Pathway:**

By investigating the barriers to customer acceptance of continuous motor monitoring sensors and identifying key attributes for wireless sensor networks in an industrial environment we will develop a low cost wireless sensor platform that can be easily deployed and adopted. This involves understand the characteristics expected in the key industrial applications, the capability of emerging radio technology combined with advanced networking technologies to obtain sufficient capability for success. This will be accomplished through a combination of site measurements and experiments followed by statistical system performance modeling. System level performance will be verified with on site field-testing. Data collected and lessons learned from these test will be integrated back into the technology and then passed along for final commercialization.

10. **Critical Technical Metrics:**
Key metrics for a wireless sensor network for equipment condition monitoring includes a minimum sensor battery life of 3 years with a reporting interval of one report per hour. This must be accomplished without interruption.

PROJECT PLANS AND PROGRESS

11. **Past Accomplishments:**

Collection and reduction of customer survey data. Complete 06/15/2004
Design and integration of site survey test equipment. Complete 05/30/2004
Primary RF technology selection: Complete 03/12/2004

12. **Future Plans:** (Please summarize the **key** milestones and deliverables with dates for the life of this project. A comprehensive activities schedule is not required.)

1. Prototype Sensor Platform design and integration: This will consist of a hardware platform using the selected component set including the key measurement sensor elements. Although not in the final package and form this prototype will be useful in collecting initial performance data at key customer sites. Expected Completion: 12/30/04
2. Collection of industrial environment site data: Expected Completion 07/30/04
3. Constructing, lab test and integration of first wireless sensor prototype platform. Expected Completion 07/30/04
4. Collection and reduction of first prototype field-test data. Expected Completion 12/30/04
5. Redesign/repackage of prototype wireless multisensor platform. Expected Complete 06/30/05
6. Integration of wireless sensor platform data with condition forecasting software Expected Complete 12/30/05
7. Initial deployment of wireless sensor and condition forecasting package in an industrial environment. Expected Complete 06/30/06
8. Refinement of wireless sensor platform and package based on field data. Expected complete 06/30/06

9. Integration of physics based prediction into reliability-based models together in condition forecasting platform. Expected complete 12/30/06
10. Additional industrial site deployment. Expected Complete 12/31/06
11. Final reports: Expected Complete 3/31/07

13. **Project Changes:**

None

14. **Commercialization Potential, Plans, and Activities:**

The end-user application for this technology is an advanced equipment condition monitoring system that will consume data from both remotely mounted wireless sensors as well as preexisting sensors and fuse that data together for the determination and estimation of usable equipment life. This technology will be offered as part of an overall assessment of plant electric motors that will assess the proper application and current condition of motor equipment. The systems integrator for this technology will be GE Energy's Energy Services business. The producer of the wireless sensor components and wireless infrastructure will be through GE Infrastructure's Sensors and Measurement business. Current plans are to install prototype systems at customer sites and demonstrate both the effectiveness and ease of installation. We will augment the voice of the customer data collected at the beginning of the program with additional application experience and uses these experiences to fine tune the product features and performance to best met the needs of the end users so that we can maximize the adoption of the technology.

15. **Patents, Publications, Presentations**

None